Remarks

Claims 1-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (WO 9937486) in view of Lee et al. (US 6,460,961).

1. Rejection of claims 1-33 under 35 U.S.C. 103(a):

Claims 1-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (W0 9937486) in view of Lee et al. (US 6,460,961) for reasons of record, as recited on pages 2-8 of the above-indicated Office action (part of paper no.5).

Response:

Claim 16 has been amended to better distinguish the present invention from Kim et al. and Lee et al. Claims 1 and 16 both now state that there are at least three distinct bubble generators in the claimed jet, with at least two bubble generators being disposed on a first side or a second side of the orifice, and at least one bubble generator being disposed on the other side.

All three bubble generators of the present invention are distinct units. That is, none of these three bubble generators are different sections of a same bubble generator--each bubble generators is its own distinct unit.

On the other hand, in Figs.2A-2D, Kim et al. teaches only two bubble generators 20 and 22, with only one on each side of the orifice. Thus, neither a first side nor a second side of the orifice contains two bubble generators.

Likewise, Lee et al. teaches in Figs.2-3 two bubble generators 120 and 150 formed concentrically around a nozzle 50. Lee et al. does not teach an orifice having distinct bubble generators disposed on a first and second side of the orifice. Although Lee et al. mentions that two or more heating elements may be used, it is never mentioned that the heating elements should be arranged with at least two distinct heating elements being disposed on one side and at least one

distinct heating element being disposed on the other side. Instead, Lee et al. teaches in both the abstract and in col. 2, lines 12-14 "two or more heating elements arranged concentrically around a nozzle." Thus, there is no motivation for one skilled in the art to place at least two heating elements on one side and at least one heating element on the other side based on Lee's concentric structure.

Therefore, neither Kim et al. nor Lee et al. teach a jet having three distinct bubble generators, with at least two bubble generators being disposed on either the first or second side of the orifice and at least one bubble generator being disposed on the other side of the orifice. The applicant submits that claims 1 and 16 are patentably distinct from Kim et al. and Lee et al., and politely requests reconsideration of claims 1 and 16.

Claims 7 and 25 have been amended to show that each heater at either the first or second side is connected in series to one heater on the other side. Moreover, the driving circuit can simultaneously drive multiple heaters on the same side or drive individual heaters on the same side, along with the heaters on the other side that share a serial connection with the driven heaters.

Claims 8 and 26 are similar to claims 7 and 25, but provide more detailed limitations. Claims 8 and 26 state that two heaters are disposed on the first side of the orifice and one heater is disposed on the second side. The driving circuit can drive the heaters on the first side simultaneously or individually. The heaters, driven individually or simultaneously, disposed on the first side will produce the first bubble. When at either or both of the heaters on the first side are driven, the heater on the second side will also be driven to produce the second bubble due to the serial connection between each of the heaters on the first side and the heater on the second side.

Support for these changes to claims 7, 8, 25, and 26 is given in paragraphs 0036 and 0036 of the specification and Figs.10 and 11. No new matter is added through these changes.

On the other hand, Kim et al. and Lee et al. do not show at least two heaters on either a first or second side, with each heater being serially connected to a heater on the second side. Thus, it is not taught or suggested that multiple heaters on the same side can be independently or simultaneously driven, thereby also driving the heater on the other side. Reconsideration of claims 7, 8, 25, and 26 is politely requested.

Since claims 2-15 are dependant on claim 1, claims 2-15 should be allowed if claim 1 is allowed. Likewise, since claims 17-33 are dependent on claim 16, claims 17-33 should be allowed if claim 16 is allowed. Reconsideration of claims 1-33 is hereby requested.

2. Introduction to new claims 34-42:

New independent claim 34 is based on original claim 16, and contains the limitation of "wherein a number of bubble generators in the first bubble generator group is different from a number of bubble generators in the second bubble generator group." This limitation is fully supported in the specification and in Fig.10 and Fig.11. No new matter is added.

On the other hand, Kim teaches in Fig.2A and Fig.2B each of the first and second bubble generator groups having one bubble generator. Lee teaches in Fig.6A to Fig.6C bubble generators formed concentrically around an orifice. Neither Kim nor Lee teach or suggest that the first bubble generator group and the second bubble generator group have a different number of bubble generators. Acceptance of new claim 34 is politely requested.

Claim 35 is added to include other limitations contained in currently amended claim 16. Claims 36-37 are supported in the specification and also in Fig.10 and Fig.11. Claims 38 through 42 are duplicates of claims 21, 22, and 24-26, respectively. No new matter is introduced through any of the new claims. Acceptance of claims 35-42 is hereby requested.

Respectfully submitted,

Date: 12/5/2003

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